



The Alarming Unsustainable Use of Groundwater Resources in Lebanon

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In the last three decades, the country has lost more than 80% of its surface water resources and its inland groundwater has dropped for more than 20 m.

Pressure on groundwater is escalating alarmingly.

Since the 1990s, Lebanon's shallow hand-dug wells have dried off and disappeared.

Groundwater exploitation allowed the expansion of intensive agriculture far from surface water sources.

High spatial density of tube wells is causing great depletion of groundwater.

Groundwater depletion is not yet documented

once enjoying ample shallow groundwater and surface water, Lebanon is facing water shortages under frequent droughts conditions.

Deep tube wells of 60 m get void subsequent to dry years.

Tube wells are distributed chaotically within the Valley. Domestic-private tube wells are still being illegally drilled.

Municipalities started to drill deep wells since the early 1990s.



Almost every residential home has a tube well.

Until the late 1970s, there was no need to draw laws and strategies for groundwater management because of its abundance.

Littoral cities and most coastal lands are subjected to saltwater intrusion.

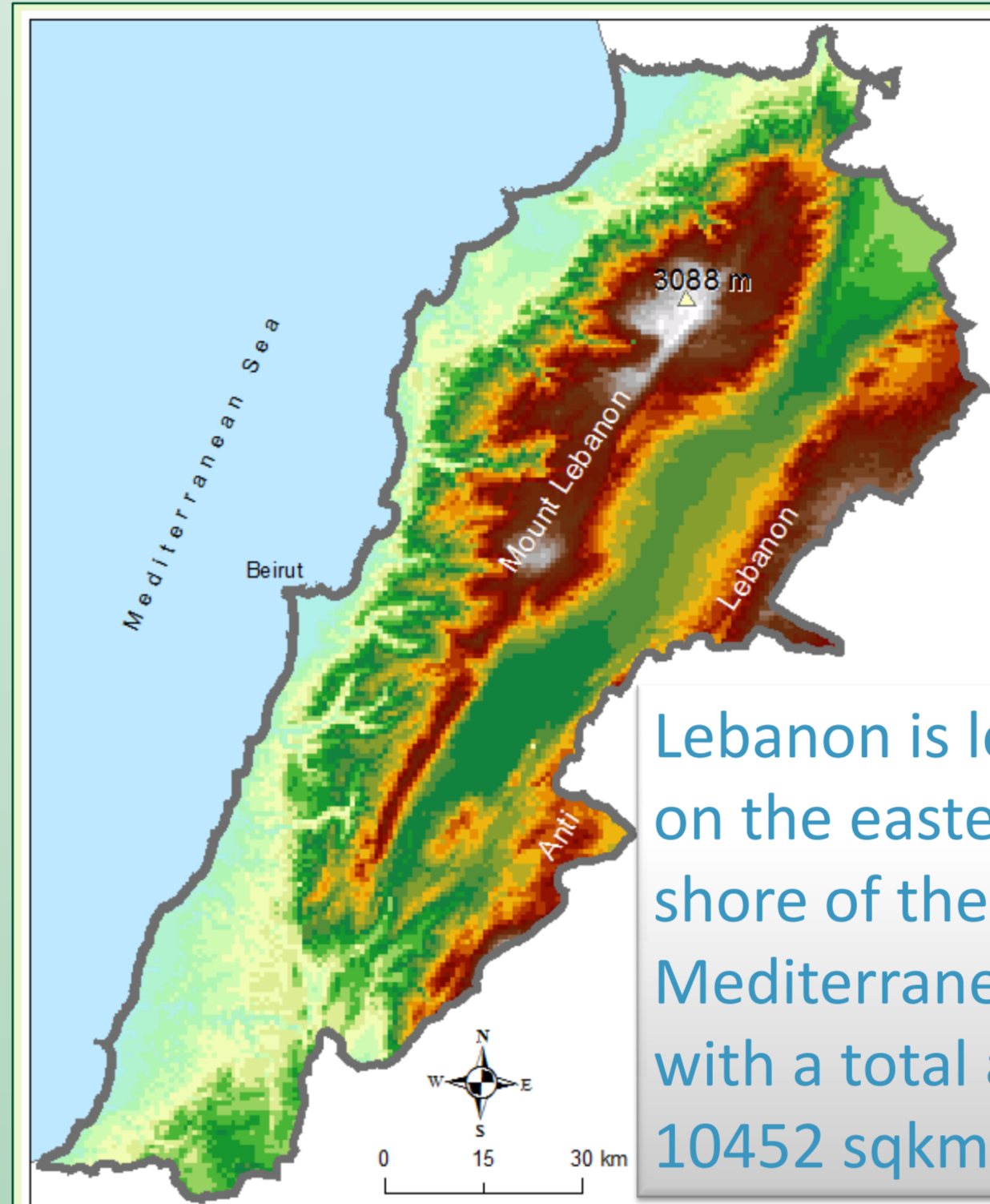
Pressure on groundwater resources over the last four decades is escalating and it should be alerted.

Mount-Lebanon to the west and Anti-Lebanon to the east are two parallel mountain chains that cross the country from southwest to northeast.

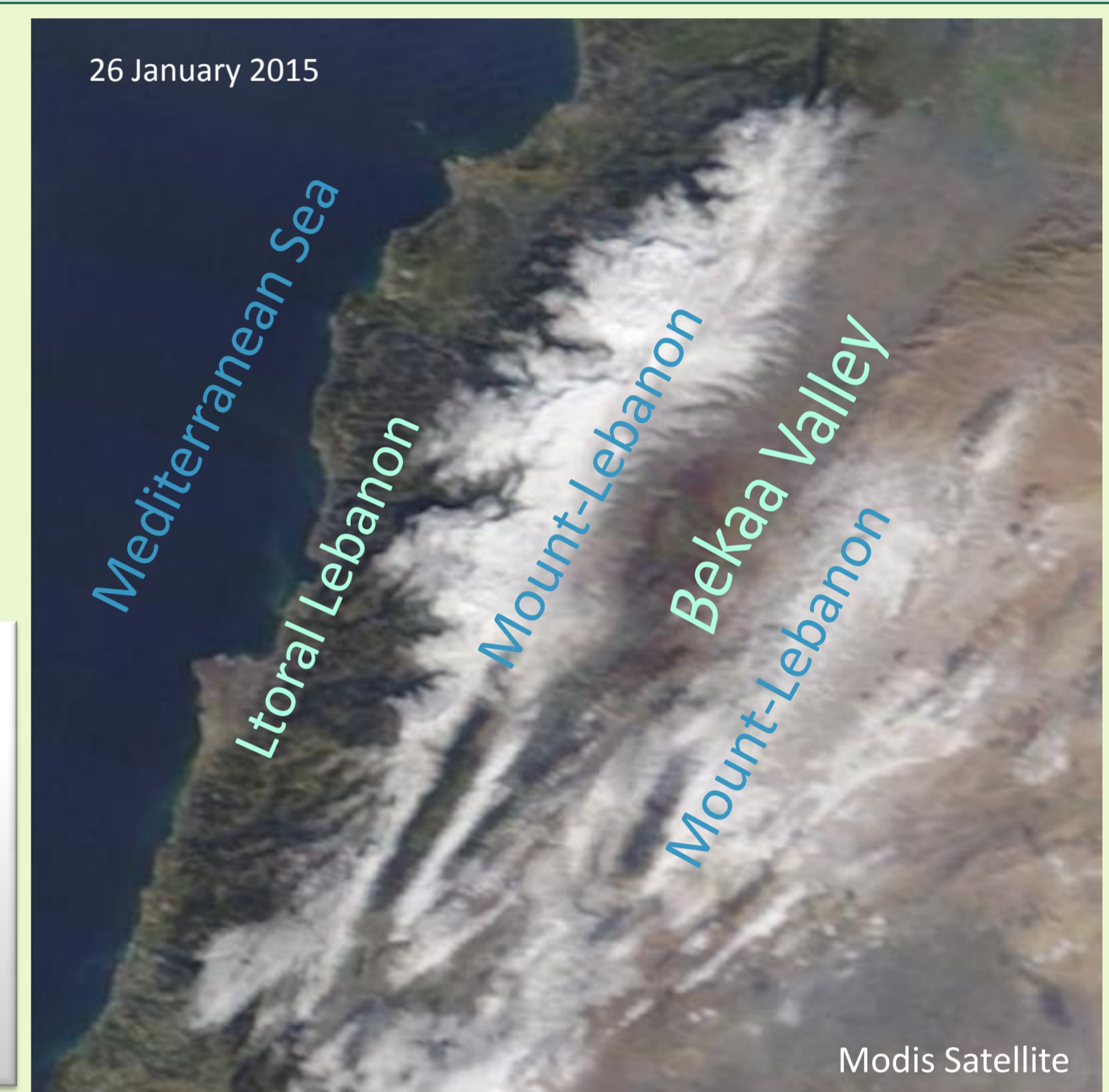
Mount-Lebanon reaches up to an elevation of 3088 m whereas as the Anti-Lebanon climbs to about 2800 m.

Snow covers most of the mountain areas in winter. Karistic limestone occupy most of Lebanon mountains which play major role in groundwater recharge.

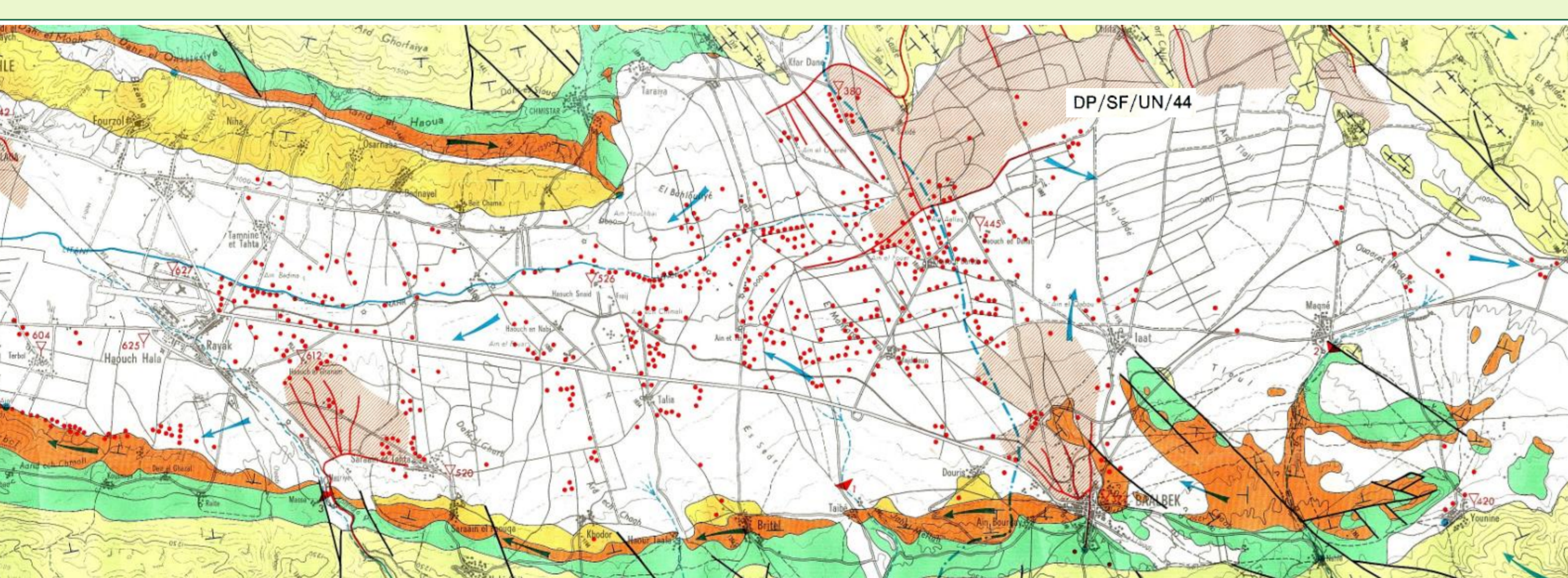
Lebanon Mountain Chains and Main Snow Accumulation Zones



Lebanon is located on the eastern shore of the Mediterranean sea with a total area of 10452 sqkm.



Wells Distribution in Central Bekaa, Lebanon (source: DP/SF/UN/44, in 1976)



Shallow wells of the year 1976 in central Bekaa

Agriculture is developing sharply over the mountains. Mountains agriculture is irrigated through rainwater harvesting reservoirs and from deep tube wells.

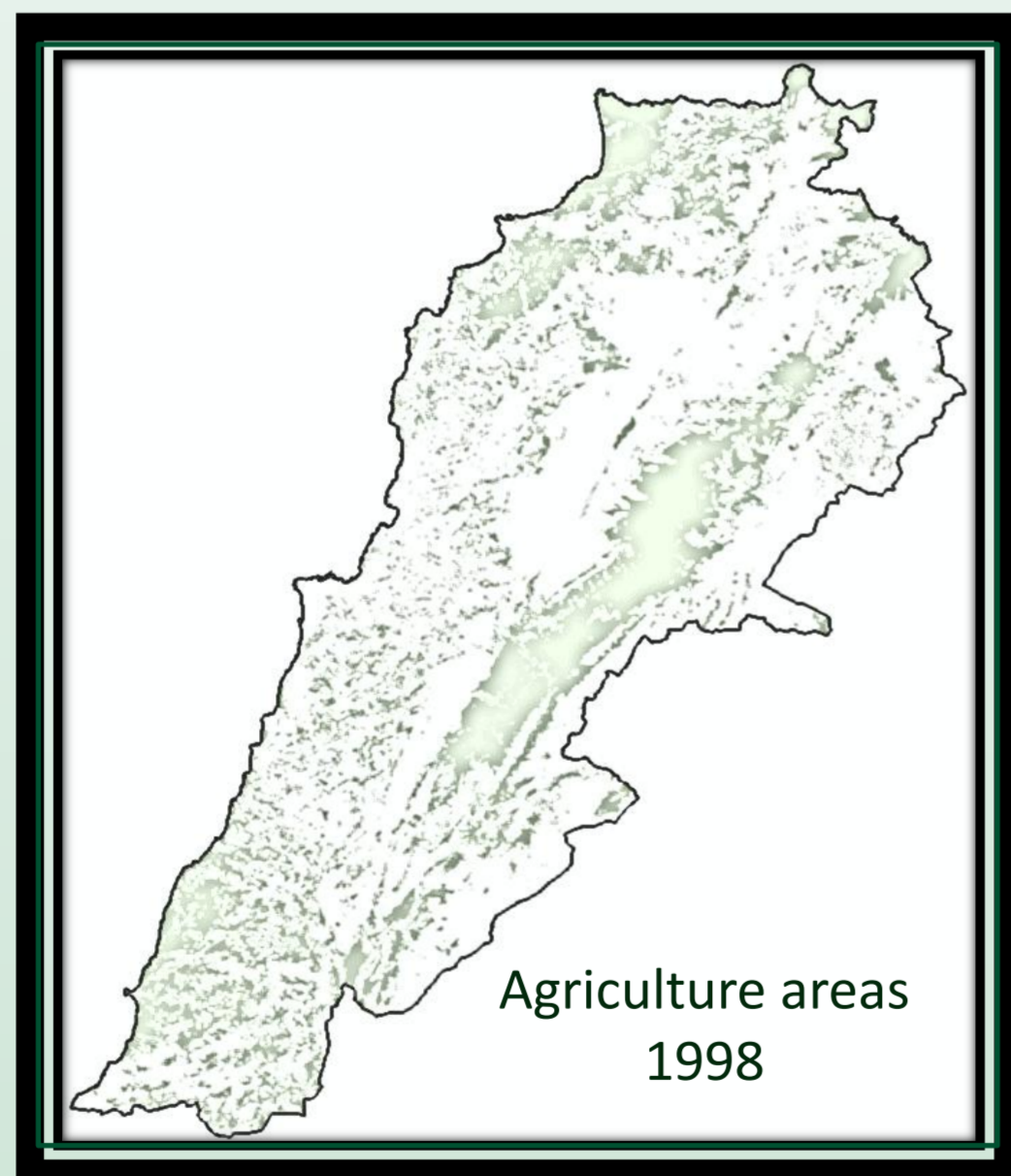
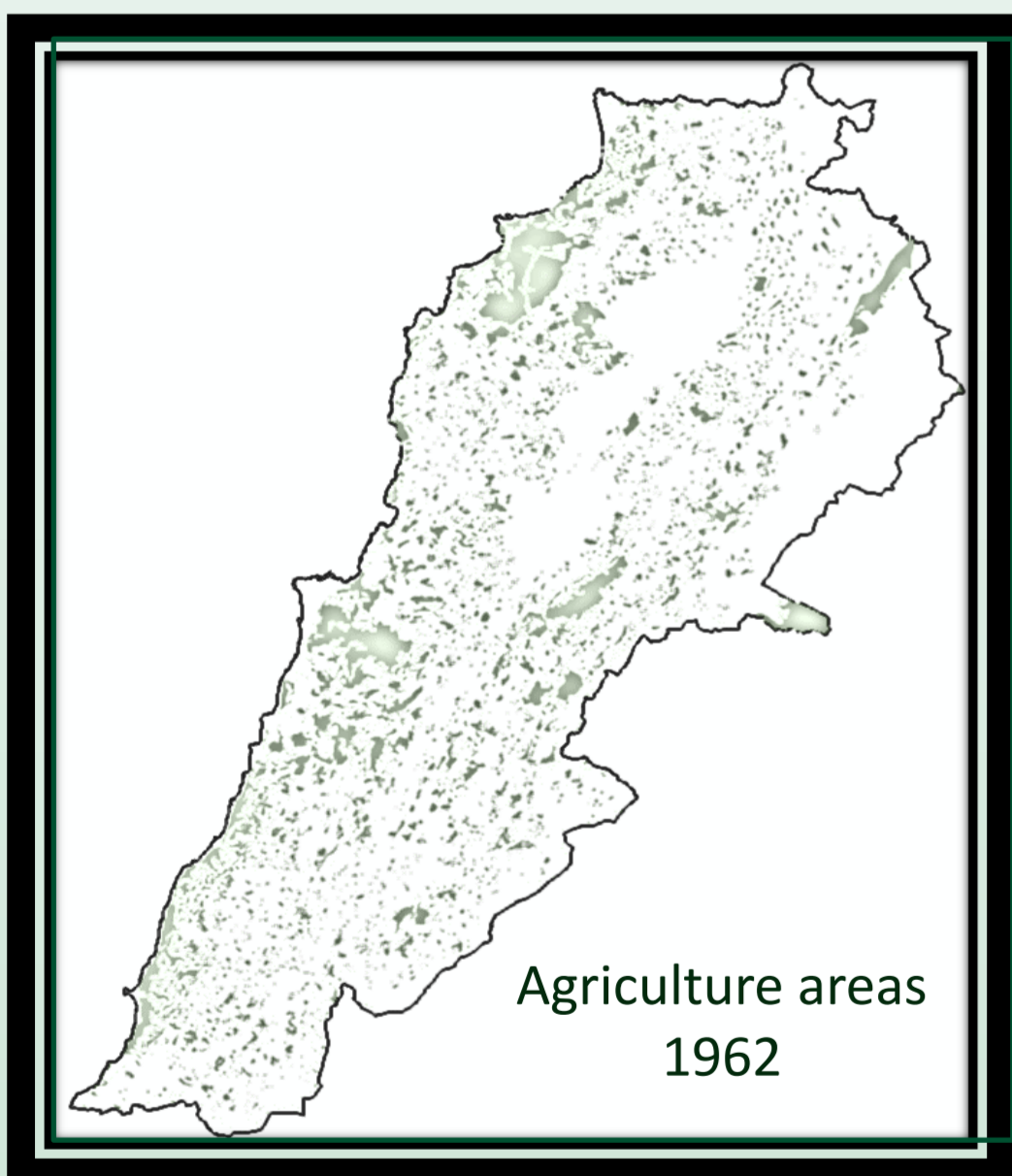
Field surveys were conducted on more than 200 farmers and on number of carwash stations. The conducted field survey aimed to understand farmers' practices and irrigation water consumption per crop.

Groundwater irrigation is applied on open field, crops, vegetables, fruit trees and greenhouses.

Labors at carwash stations were friendly asked on head to head discussion. This is because carwash owners provided misleading information.

Agriculture at the Coast and Inlands

Lebanon is in a region of frequent drought events and in intense manners where groundwater aquifers are heavily used as additional water source.



Greenhouses and irrigated agriculture is spreading rapidly on the lower to upper mountain elevations of the littoral areas. Agriculture consumes over 70% of the available fresh water in the country, as always stated.

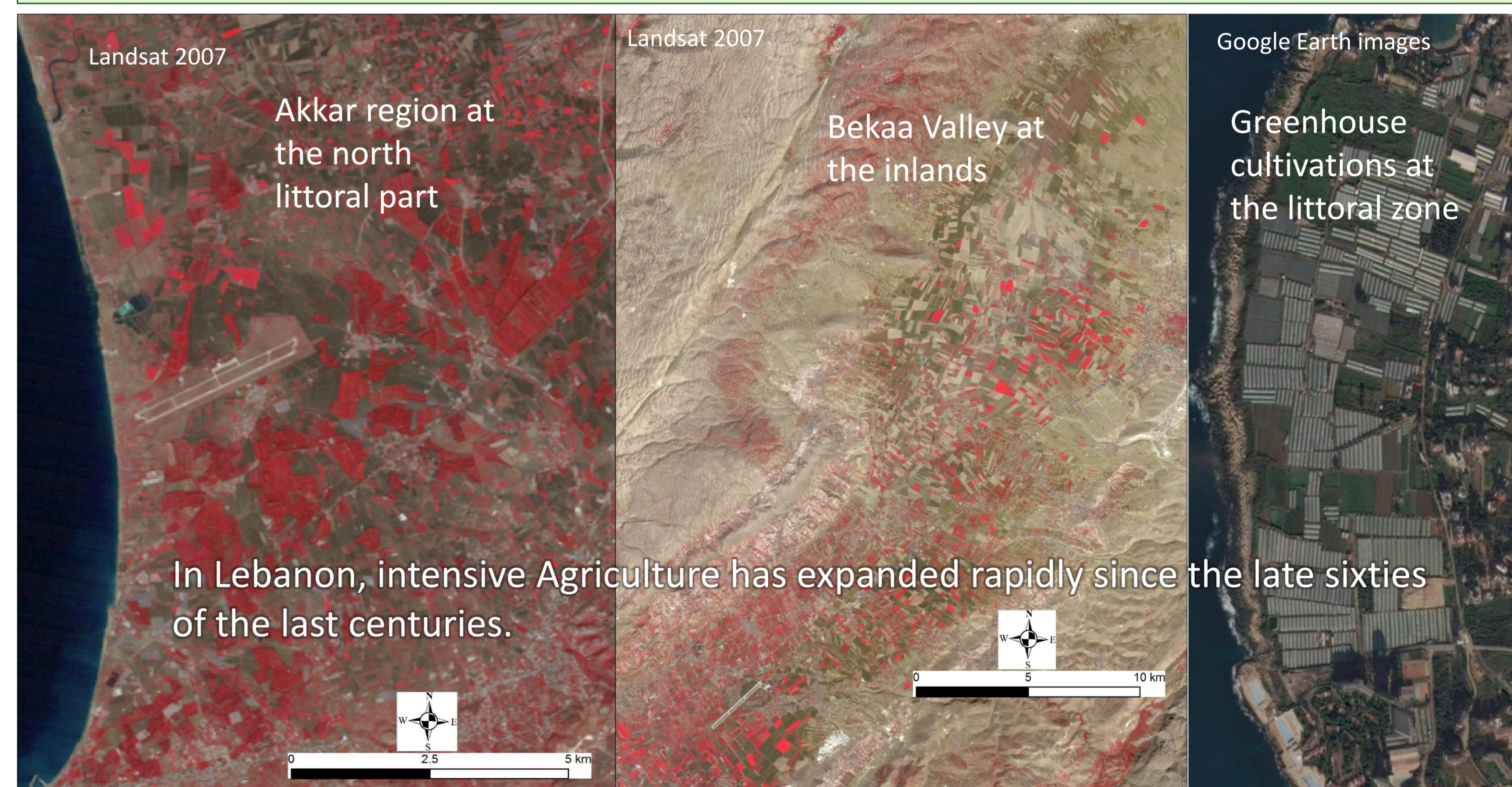
Groundwater pumping and abstraction exceeded recharge for large areas and for a long period in the country.

These groundwater heavy abstractions have led to overexploitation and to groundwater depletion. The lowering of groundwater piezometric levels has negatively affected the surface water where streamflows dried off in several places.

In Lebanon, most agricultural areas depend on unmanaged groundwater which present a threat of resources depletion, especially in places where recharge does not compensate for intensive groundwater use.

Continuous decline of groundwater levels has been observed at Central and Northern parts of the Bekaa Valley and at the coastal areas.

Agriculture is among the largest consumer of groundwater but there is lack of informative statistics and accurate monitoring.



In Lebanon, intensive Agriculture has expanded rapidly since the late sixties of the last centuries.

Tube wells technologies facilitated the abstraction of groundwater independently of place and time.

Private wells are assuring water on demand where pumping technologies are available on diesel and electrical power. New technologies of tube wells and powerful pumping have widened the area of intensive cultivations. Farmers pump water from whatever depth and in uncontrolled amount.

Farmers over-irrigate summer crops and they apply irrigation scheduling in standards form between years and per crop. Farmers apply similar irrigation techniques they have almost identical watering schedule.

Lebanon must not wait until monitoring of water resources reach an answer. Governance of these resources should have strategies that draw future lines regardless of quantification and monitoring. Governance of groundwater is considered lacking or considerably weak. Enforcement of laws must be started to stop destruction of such precious resources.